

INTERNATIONAL STANDARD

ISO
4392-3

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Hydraulic fluid power — Determination of characteristics of motors —

Part 3:

At constant flow and at constant torque

*Transmissions hydrauliques — Détermination des caractéristiques des
moteurs —*

Partie 3: Essai à débit constant et couple constant



Reference number
ISO 4392-3:1993(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 4392-3 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Sub-Committee SC 8, *Product testing and contamination control*.

ISO 4392 consists of the following parts, under the general title *Hydraulic fluid power — Determination of characteristics of motors*:

- *Part 1: At constant low speed and at constant pressure*
- *Part 2: Startability*
- *Part 3: At constant flow and at constant torque*

Annexes A and B form an integral part of this part of ISO 4392.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a fluid under pressure within an enclosed circuit.

Hydraulic motors are units which transform hydraulic energy into mechanical energy, usually with a rotary output.

Hydraulic fluid power — Determination of characteristics of motors —

Part 3:

At constant flow and at constant torque

1 Scope

This part of ISO 4392 describes a method of determining the low-speed characteristics of positive-displacement rotary fluid power motors under constant flow and constant torque conditions. Motors may be of either the fixed or variable-displacement type.

The method involves testing at slow speeds, which may generate frequencies having a significant influence upon the steady continuous torque output of the motor and affect the system to which the motor would be connected.

The accuracy of measurement is divided into three classes, A, B and C, which are explained in annex A.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4392. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4392 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1219-1:1991, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols.*

ISO 3448:1992, *Industrial liquid lubricants — ISO viscosity classification.*

ISO 4391:1983, *Hydraulic fluid power — Pumps, motors and integral transmissions — Parameter definitions and letter symbols.*

ISO 4409:1986, *Hydraulic fluid power — Positive displacement pumps, motors and integral transmissions — Determination of steady-state performance.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 8426:1988, *Hydraulic fluid power — Positive displacement pumps and motors — Determination of derived capacity.*

3 Definitions

For the purposes of this part of ISO 4392, the definitions given in ISO 4391 and ISO 5598 and the following definition apply.

3.1 complete motor cycle: The total angular movement of the motor output shaft needed to achieve a repetitive leakage and/or torque recording. In most motors this will be 360°; however, in some, such as gear motors, it may be several shaft revolutions.

4 Symbols

4.1 The physical quantity letter symbols and their suffixes used in this part of ISO 4392 are in accordance with ISO 4391. Units are given in table 1.

4.2 The graphical symbols used in figure 1 are in accordance with ISO 1219-1.

Table 1 — Symbols and units

Quantity	Symbol	Dimension ¹⁾	SI unit ²⁾
Rotational speed	n	T^{-1}	r/min
Pressure, differential pressure	$p, \Delta p$	$ML^{-1}T^{-2}$	Pa
Flowrate	q	L^3T^{-1}	m ³ /min
Torque	T	ML^2T^{-2}	N·m
Time	t	T	s
Swept volume	V	L^3	m ³
Temperature	θ	Θ	°C
1) M = mass; L = length; T = time; Θ = temperature. 2) The practical units which may be used for the presentation of results are given in annex B.			

5 Test installation

5.1 Hydraulic test circuit

5.1.1 A hydraulic test circuit similar to that shown in figure 1 shall be used.

WARNING — The basic circuit shown in figure 1 does not incorporate all the safety devices necessary to protect against damage in the event of component failure. It is important that those responsible for carrying out these tests give due consideration to safeguarding both staff and equipment.

5.1.2 A fluid-conditioning circuit (figure 1) together with shut-off valve **5** and relief valve **7** shall be installed. Valve **5** may be opened to facilitate operation at high speed in order to reach the test operating temperature rapidly (see 8.2). Valve **5** shall be closed during the test.

5.1.3 A fluid-conditioning circuit shall be installed which provides the filtration necessary to protect the test motor and the other circuit components and which will maintain the fluid temperatures specified in clause 7.

5.1.4 A constant motor supply flowrate is obtained by a flow control valve with viscosity and pressure compensation.

5.1.5 Constant torque load can be obtained using a positive-displacement pump and a flow control valve with a torque signal electric feedback (or a magnetic power brake or any other suitable system).